PSYCHE

VOL. XXII AUGUST, 1915 No. 4

A PRELIMINARY LIST OF THE ANTHOPHILOUS COLEOPTERA OF NEW ENGLAND.

By John H. Lovell,
Waldoboro, Maine.

The following list of the flower-visiting beetles of New England is based on observations extending over more than ten years. No records are given of visits that were known to be accidental, or of captures that were made by sweeping. The writer has worked only at Waldoboro, Maine; all other records whether in Maine or Massachusetts should be credited to Mr. C. A. Frost of Framingham, Mass. To avoid needless repetition the following abbreviations for localities are employed: F. for Framingham, S. for Sherborn, and H. for Hopkinton, Mass.; and W. for Waldoboro, Maine. In the determination of the more difficult species the authors desire to acknowledge the assistance of Mr. E. A. Schwarz, Col. T. L. Casey, Mr. Charles Dury and Mr. W. S. Fisher; the larger part of the material taken at Waldoboro, Maine, was some years ago kindly identified by Professor H. F. Wickham. Where only the generic names Cornus and Viburnum appear in the list the species may usually be understood to be *C. alternifolia* and *V. nudum*.

Carabidæ.

Lebia atriventris Say. Solidago, S.

L. fuscata Dej. Prunus virginiana, S.

L. furcata Lec. Solidago, S.

L. ornata Say. Solidago, Cornus, Eupatorium perfoliatum, F. Amelanchier canadensis, S. Viburnum, H. Solidago rugosa, W.

L. pectita Horn. Solidago, F.

L. pumila Dej. Solidago, H.

L. viridis Say. Solidago, Spiræa salicifolia, Amelanchier canadensis, Viburnum, F. Prunus virginiana, H. Cornus alternifolia, W.

L. viridis var. *mœsta* Lec. Solidago, F.

L. viridipennis Dej. Solidago, S.

PHALACRIDÆ.

Olibrus pallipes Say. Solidago, Natick, Mass.
Phalacrus politus Say. Cornus, S.

STAPHYLINIDÆ.

Anthobium convexum Fauv. Viburnum, Pyrus arbutifolia, S. Acer spicatum, W. In Stuben County, Ind., this species is common on the flowers of Sambucus racemosa and Viburnum prunifolium.[1]
A. pothos Mann. Pyrus arbutifolia, F. Clintonia borealis, W.
Arpedium tenue Lec. Viburnum, Monmouth, Me.
Homalium rufipes Fauv. Viburnum, S.
Placusa tacomæ Casey. Viburnum, Monmouth, Me.

COCCINELLIDÆ.

Adalia bipunctata L. Pyrus communis, H. Viburnum, S.
A. humeralis Say. Salix discolor, Asclepias, F.
Anisosticta strigata Thun. On flowers of an early grass.
Brachyacantha ursina Fab. Cornus, Southboro, Mass. Chrysanthemum Leucanthemum, W.
Coccinella sanguinea L. Cornus, Southboro, Mass. Solidago, S.
C. trifasciata L. Amelanchier canadensis, Viburnum, S. Ribes prostratum, W.
C. transversoguttata Fab. Asclepias, F.
Hippodamia glacialis Fab. Asclepias, F.
H. convergens Guen. Asclepias, Solidago, F.
H. 13-punctata L. Solidago, F. Taraxicum officinale, W.
H. parenthesis Say. Spiræa salicifolia, Daucus Carota, F.
Hyperaspis undulata Say. Daucus Carota, S.
H. octavia Casey. Salix, Natick, Mass.
Megilla maculata DeG. Eupatorium perfoliatum, Solidago, Aster, Daucus Carota, Brassica, S.
Psyllobora 20-maculata Say. Solidago, F.
Scymnus americanus Muls. Amelanchier canadensis, S.
S. indutus Casey. Prunus virginiana, S.

CRYPTOPHAGIDÆ.

Antherophagus ochraceus Melsh. Spiræa salicifolia, Monmouth, Me. Rosa humilis, W.
Telmatophilus (*Loberus*) *impressus* Lec. Viburnum, F.
Tomarus pulchellus Lec. Amelanchier canadensis, S.

EROTYLIDÆ.

Acropteroxys gracilis Newm. Rosa humilis, F.

---

[1] "The Coleoptera in Indiana," p. 481.

DERMESTIDÆ.

Anthrenus castaneæ Melsh. Aralia hispida, W.

A. musæorum L. Spiræa salicifolia, Soldiago, Eupatorium perfoliatum, Viburnum, Cornus, S. Achillea Millefolium, Paris, Me. Thalictrum polygamum, Chrysanthemum Leucanthemum, Monmouth, Me.

A. scrophulariæ L. Pyrus arbutifolia, Cornus, F. Prunus virginiana, H. Spiræa salicifolia, Viburnum, Natick, Mass.

A. verbasci Oliv. Viburnum, Natick, Mass.

Attagenus pellio L. Amelanchier canadensis, Pyrus communis, H.

A. piceus Oliv. Cornus, Viburnum, Rubus, F.

Byturus unicolor Say. Prunus virginiana, H. Rubus idæus, Monmouth, Me. Anemone quinquefolia, W.

Cryptorhopalum hæmorrhoidale Lec. Spiræa salicifolia, F. Viburnum, Monmouth, Me.

C. picicorne Lec. Fragaria virginiana, F. Cornus, Viburnum, Pyrus arbutifolia S. Prunus virginiana, Solidago, H.

C. triste Lec. Solidago, S.

NITIDULIDÆ.

Carpophilus brachypterus Say. Pyrus arbutifolia, Prunus virginiana, Cornus, F. Amelanchier canadensis, Prunus pennsylvanica, Pyrus communis, H. Viburnum Lentago, W.

Cercus abdominalis Er. Amelanchier canadensis, Pyrus communis, H. Spiræa salicifolia, Pyrus arbutifolia, Viburnum, S. Sambucus canadensis, Monmouth, Me.

Conotelus obscurus Er. Convolvulus, Sambucus canadensis, F. Monmouth, Me. Cornus, Southboro, Mass.

Epuræa sp. Viburnum, Monmouth, Me.

Colastus truncatus Rand. Viburnum Lentago, W.

LATHRIDIIDÆ.

Melanophthalma distinguenda Com. Amelanchier canadensis, F.

DASCYLLIDÆ.

Cyphon collaris Guer. Prunus virginiana, S.

C. obscurus Guer. Viburnum, Natick, Mass.

C. padi L. Pyrus arbutifolia, H.

C. variabilis Thumb. Salix discolor, F. Amelanchier canadensis, Prunus virginiana, S. Salix discolor, W.

ELATERIDÆ.

Agriotes stabilis Lec. Rubus idæus, Monmouth, Me. Viburnum nudum, W.

A. oblongicollis Melsh. Prunus virginiana, Viburnum, S.

A. fucosus Lec. Viburnum nudum, W.

A. sp. Prunus virginiana, W.

Asaphes decoloratus Say. Chrysanthemum Leucanthemum, W.

Corymbites hamatus Say. Acer spicatum, W.
C. inflatus Say. Prunus virginiana, H.
C. hieroglyphicus Say. Prunus virginiana, H. Acer spicatum, W.
C. medianus Germ. Prunus virginiana, H.
C. metallicus Payk. Cornus stolonifera, W.
C. tarsalis Melsh. Amelanchier canadensis, S. Prunus virginiana, H. Salix, Viburnum, Natick, Mass.
C. tessellatus L. Rubus allegheniensis, S.
C. triundulatus Rand. Prunus virginiana, Amelanchier canadensis, S.
C. vernalis Hentz. Prunus serotina, Wales, Me.
Cardiophorus sp. Cornus canadensis, W.
Dolopius lateralis Esch. Geranium maculatum, Prunus virginiana, Viburnum, S. Viburnum alnifolium, W.
Elater collaris Say. Viburnum, Natick, Mass. Aralia hispida, W.
E. militaris Harr. Viburnum, S.
E. miniipennis Lec. Pyrus arbutifolia, H. Viburnum, F. Spiræa salicifolia, W.
E. nigricans Germ. Amelanchier canadensis, S.
E. nigricollis Hbst. Amelanchier canadensis, S.
E. pedalis Germ. Amelanchier canadensis, F. Cornus, S. Pyrus arbutifolia, Wales, Me.
E. rubricus Say. Amelanchier canadensis, Prunus virginiana, Viburnum, Rubus, F. Viburnum alnifolium, W.
Megapenthes rogersii Horn. Viburnum alnifolium, W.
Melanotus americanus Hbst. Cornus, F.
M. communis Gyll. Viburnum, Natick, Mass.
M. leonardi Lec. Rubus idæus, Paris, Me.
M. sagittarius Lec. Viburnum, Natick, Mass.
M. trapezoideus Lec. Amelanchier canadensis, S.
Limonius confusus Lec. Prunus virginiana, Viburnum, S.
L. basilaris Say. Crataegus, H. Viburnum, Natick, Mass. Cornus, F.
L. griseus Beauv. Cornus, S.
L. nitidulus Horn. Viburnum, S.
L. plebejus Say. Pyrus arbutifolia, Prunus virginiana, H. Cornus, F. Viburnum, Natick, Mass.
L. stigma Hbst. Prunus virginiana, H.
Œstodes tenuicollis Rand. Chrysanthemum Leucanthemum, W.
Oxygonus obesus Say. Viburnum, Monmouth, Me.
Sericus silaceus Say. Viburnum, Monmouth, Me.
Sericosomus incongruus Lec. Viburnum dentatum, W.

BUPRESTIDÆ.

Acmæodera tubulus Fab. Geranium maculatum, Viburnum, Rubus idæus, Achillea Millefolium, S. Prunus virginiana, Amelanchier canadensis, Cornus florida, H.

LAMPYRIDÆ.

Chauliognathus pennsylvanicus DeG. Solidago, F., W., and Monmouth, Me.
Ellychnia corrusca L. Amelanchier canadensis, S. Cratægus, H. Cornus canadensis, W.
Lucidota atra Fab. Iris versicolor, W.
Podabrus nothoides Lec. Acer spicatum, W.
P. tricostatus Say. Viburnum, Natick, Mass.
P. rugulosus Lec. Cornus, F.
Pyractomena angulata Say. Aralia hispida, W.
Pyropyga decipiens Harr. Cornus, Southboro, Mass. Aralia hispida, W.
P. nigricans Say. Cornus, Southboro, Mass.
Telephorus bilineatus Say. Prunus virginiana, H.
T. carolinus Fab. Cornus, Natick, Mass.
T. excavatus Lec. Rubus, Viburnum, S.
T. fraxini Say. Brassica campestris, Natick, Mass. Cornus canadensis, Aralia hispida, W.
T. lineola Fab. Viburnum, Prunus, S.
T. rectus Mesh. Cornus, Southboro, Mass.
T. rotundicollis Say. Viburnum, S.
T. scitulus Say. Epilobium angustifolium, W.
T. tuberculata Lec. Brassica campestris, Natick, Mass.

MALACHIIDÆ.

Attalus terminalis Er. Ceanothus americanus, Prunus virginiana, S. Achillea Millefolium, Paris, Me. Rhus typhina, W.
A. scincetus Say. Cornus florida, Prunus virginiana, H. Viburnum, S.
Collops nigriceps Say. Prunus virginiana, H.
Malachius æneus L. Viburnum, Natick, Mass.
Pseudobæus oblitus Lec. Prunus virginiana, H.

CLERIDÆ.

Trichodes nuttalli Kirby. Spiræa salicifolia, Solidago, Monmouth, Me. Chrysanthemum Leucanthemum, W.
Laricobius erichsoni Rosen. Salix, S.

SCARABÆIDÆ.

Aphodius fimetarius L. Spiræa salicifolia, W.
Amphicoma vulpina Hentz. Achillea Millefolium, F. Spiræa, Monmouth, Me.
Euphoria fulgida Fab. Prunus virginiana, H. and Monmouth, Me.
Hoplia trifasciata Say. Amelanchier canadensis, Prunus virginiana, Viburnum, Cornus, F. Viburnum dentatum, Vaccinium vacillans, W.
H. tristis Melsh. Salix discolor, Amelanchier canadensis, F. Prunus virginiana, S.
Macrodactylus subspinosus Fab. Spiræa salicifolia, Viburnum, Cornus, F. Achillea Millefolium, Sambucus canadensis, Southboro, Mass. Viburnum dentatum, W.

Serica tristis Lec. Rubus allegheniensis, Wales, Me.

Trichius affinis Gory. Spiræa salicifolia, Rubus, Viburnum, Cornus, F. Viburnum dentatum, W.

T. piger Fab. Spiræa salicifolia, Cornus, F. Viburnum, S.

CERAMBYCIDÆ.

Acmæops bivittata Say. Pyrus americana, Mt. Washington, N. H.

A. pratensis Laich. Achillea Millefolium, Paris, Me.

Callimoxys sanguinicollis Oliv. Prunus virginiana, Viburnum acerifolium, H.

Cyllene robiniæ Forst. Solidago, Brookline, Mass.

Clytanthus ruricola Oliv. Ceanothus americanus, F. Epilobium angustifolium, Eupatorium perfoliatum, W.

Cyrtophorus verrucosus Oliv. Prunus virginiana, H. Viburnum alnifolium, W.

Euderces picipes Fab. Ceanothus americanus, Spiræa salicifolia, Viburnum, F. Rhus vernix, Southboro, Mass.

Elytroleptus floridanus Lec. Occasionally taken on the flowers of the oak (Quercus), Natick, Mass.

Gaurotes cyanipennis Say. Viburnum, Cornus, F. Prunus virginiana, H.

Microclytus frosti Casey. Viburnum, Paris, Me.

M. gazellula Hald. Viburnum alnifolium, W.

Molorchus bimaculatus Say. Cornus florida, Prunus virginiana, Viburnum, H. Viburnum nudum, W.

Pachyta monticola Rand. Spiræa salicifolia, Paris, Me. Viburnum nudum, W.

Leptura bifloris Newm. Spiræa salicifolia, Monmouth, Me.

L. capitata Newm. Viburnum, Natick, Mass.

L. canadensis Fab. Spiræa salicifolia, Wales, Me. Solidago serotina, W.

L. circumdata Oliv. Ceanothus americanus, Prunus virginiana, Viburnum, Cornus, S.

L. cordifera Oliv. Ceanothus americanus, Cornus, Solidago, S.

L. chrysocoma Kirby. Viburnum dentatum, Aralia hispida, W.

L. deleta Lec. Spiræa salicifolia, S.

L. lineola Say. Prunus virginiana, Spiræa salicifolia, Cornus florida, Zizia aureum, H. Cornus alternifolia, W.

L. mutabilis Newm. Ceanothus americanus, Prunus virginiana, S. Viburnum nudum, W.

L. hæmatites Newm. Cornus florida, Vibernum, H. Cornus alternifolia, S.

L. nitens Forst. Cornus alternifolia, S.

L. pedalis Lec. Pyrus americana, Mt. Washington, N. H.

L. pubera Say. Viburnum, S. Rubus idæus, Viburnum, Monmouth, Me.

L. proxima Say. Thalictrum polygamum, Viburnum, Monmouth, Me. Spiræa salicifolia, Rhus typhina, W.

L. octonotata Say. Viburnum, F.

L. subargentata Kirby. Cornus, Viburnum, S. Viburnum, Mt. Washington, N. H. Thalictrum polygamum, Monmouth, Me.

L. subhamata Rand. Spiræa salicifolia, Wales, Me.

L. rubrica Say. Spiræa salicifolia, S.

L. vagans Oliv. Ceanothus americanus, Spiræa salicifolia, S. Aralia hispida, W.

L. vittata Germ. Spiræa salicifolia, Ceanothus americanus, S. Aralia hispida, Cornus alternifolia, W.

Strangalia acuminata Oliv. Rhus vernix, H. Spiræa salicifolia, S. Cornus, Viburnum, Southboro, Mass.

S. famelica Newm. Spiræa salicifolia, F.

S. luteicornis Fab. Spiræa salicifolia, S.

Saperda candida Fab. Solidago rugosa, W.

Typocerus velutinus Oliv. Eupatorium perfoliatum, Solidago, F. Viburnum, Asclepias, S. Solidago bicolor, W.

Spiræa salicifolia, Solidago, Thalictrum polygamum, Monmouth, Me.

Xylotrechus colonus Fab. Viburnum, Ashland, Mass.

CHRYSOMELIDÆ.

Calligrapha philadelphica L. Amelanchier canadensis, S.

Crepidodera helixenes L. Prunus virginiana, H.

Chrysodina globosa Say. Ceanothus americanus, F.

Chrysomela scalaris Lec. Cornus alternifolia, W.

Diabrotica atripennis Say. Solidago, H.

D. 12-punctata Oliv. Solidago, Aster, F. Convolvulus sepium, W.

D. vittata Fab. Amelanchier canadensis, Prunus virginiana, Salix, Viburnum, Cornus, S. Solidago rugosa, W.

Diachus auratus Fab. Cornus, F. Achillea Millefolium, Paris, Me. Spiræa salicifolia, Diplopappus umbellatus, W.

Disonycha pennsylvanica Ill. Prunus virginiana, Amelanchier canadensis, Pyrus communis, H.

Donacia piscatrix Lac. Nymphæa advena, W.

D. æqualis Say. Sagittaria latifolia, W.

D. rufa Say. Iris versicolor, W.

Galerucella nymphææ L. Nymphæa advena, W.

Luperodes meraca Say. Viburnum, F.

Monachus ater Hald. Solidago, F.

Nodonota puncticollis Say. Spiræa salicifolia, Monmouth, Me. Rosa humilis, W.

Œdionychis limbalis Melsh. Amelanchier canadensis, S.

Orsodachna atra Ahr. Amelanchier canadensis, Salix, H. Six varieties on Viburnum, Paris, Me. Cornus alternifolia, W.

Pachybrachys subfasciatus Hald. Prunus virginiana, Cratægus, H.

Triachus cerinus Lec. Ceanothus americanus, S.

BRUCHIDÆ.

Bruchus calvus Horn. Spiræa salicifolia, Solidago, F.

B. obtectus Say. Amelanchier canadensis, S.

CISTELIDÆ.

Cistela sericea Say. Spiræa salicifolia, Castanea dentata, F.

Isomira quadristriata Coup. Prunus virginiana, H. Cornus alternifolia, Acer spicatum, Rhus typhina, W.

MELANDRYIDÆ.

Mycterus scaber Hald. Spiræa salicifolia, Ceanothus americanus, Solidago, Cornus, F.

ŒDEMERIDÆ.

Asclera ruficollis Say. Amelanchier canadensis, F. Prunus virginiana, H. Thalictrum polygamum, Monmouth, Me. Viburnum alnifolium, W.

CEPHALOÖNIDÆ.

Cephaloön lepturides Newm. Viburnum, Milton, Mass. Cornus alternifolia, W.

MORDELLIDÆ.

Anaspis flavipennis Hald. Cornus florida, Prunus virginiana, H. Spiræa salicifolia, F. Thalictrum polygamum, Monmouth, Me.

A. rufa Say. Prunus virginiana, Viburnum, H. Thalictrum polygamum, Monmouth, Me. Viburnum dentatum, Aralia hispida, Polygonum cilinode, W.

Mordella melæna Germ. Spiræa salicifolia, Wales, Me.

M. marginata Melsh. Spiræa salicifolia, S. Viburnum dentatum, Aralia hispida, Rosa humilis, Rhus typhina, W.

M. scutellaris Fab. Prunus virginiana, Natick, Mass. Spiræa salicifolia, W.

Mordellistena aspersa Melsh. Viburnum, Natick, Mass.

M. biplagiata Helm. Spiræa salicifolia, Southboro, Mass. Viburnum nudum, W.

M. comata Lec. Spiræa salicifolia, Eupatorium purpureum, Natick, Mass.

M. intermixta Helm. Viburnum, S.

M. limbalis Melsh. Spiræa salicifolia, S.

M. unicolor Lec. Eupatorium purpureum, S.

ANTHICIDÆ.

Corphyra lugubris Say. Cornus alternifolia, Veratrum viride, Viburnum Lentago, W.

MELOIDÆ.

Epicauta pennsylvanica DeG. Aster, Solidago, S. Solidago lanceolata, W.

Pomphopæa ænea Say. Amelanchier canadensis, H.

P. sayi Lec. Ceanothus americanus, F. Prunus virginiana, H.

RHIPIPHORIDÆ.

Myodites fasciatus Say. Solidago, F.

Rhipiphorus limbatus Fab. Solidago, S.

RHYNCHITIDAE.

Rhynchites bicolor Fab. Rosa humilis, F.

CURCULIONIDÆ.

Anthonomus corvulus Lec. Pyrus arbutifolia, Prunus virginiana, H. Cornus alternifolia, W.

A. moleculus Casey. Fragaria virginiana, F.

A. quadrigibbus Say. Prunus virginiana, F.

A. signatus Say. Rubus allegheniensis, S.

Balaninus obtusus Blanch. Cornus, F.

Centrinus scutellum-album Say. Chrysanthemum Leucanthemum, Spiræa salicifolia, S.

Conotrachelus nenuphar Hbst. Prunus virginiana, H. W.

Dorytomus brevicollis Lec. Salix discolor, S.

Geræus picumnus Hbst. Viburnum, Aster, F.

Listronotus appendiculatus Boh. Sagittaria latifolia, W.

Lixus concavus Say. Ranunculus, F.

Madarus undulatus Say. Solidago, F.

Mononychus vulpeculus Fab. Iris versicolor, F. W.

Nicentrus lineicollis Boh. Ceanothus americanus, Solidago, F.

Orchestes pallicornis Say. Amelanchier canadensis, S.

Piazorhinus scutellatus Say. Viburnum, F.

Pseudanthonomus cratægi Walsh. Amelanchier canadensis, Prunus virginiana, F.

Rhinoncus pyrrhopus Boh. Rumex acetosella, F.

PARANOMOPONE, A NEW GENUS OF PONERINE ANTS FROM QUEENSLAND.[1]

BY WILLIAM MORTON WHEELER.

Paranomopone gen. nov.

Worker. Rather small, monomorphic. Mandibles triangular, with toothed apical borders. Clypeus short, not produced in the middle, indistinctly marked off from the remainder of the head. This is also true of the triangular frontal area. Frontal carinæ distinctly dilated, further apart than the distance of each to the lateral border of the head, concealing the insertions of the antennæ, continued back about three-fourths the length of the head as the medial border of a deep scrobe which lies entirely dorsal to the eye. The ventral border of this scrobe, which is somewhat more than three times as long as broad, is also very sharp. Its depression is divided by a median longitudinal ridge which does not extend to the posterior end of the scrobe, so that the latter is incompletely separated into two compartments, one for the accommodation of the scape and one for the funiculus, when

---

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 93.

the antenna is folded back against the head. Eyes small, situated behind the middle of the head. Ocelli absent. Antennæ 12-jointed, funiculus somewhat enlarged at the tip into a 3-jointed club, which, however, is not very sharply marked off from the more basal joints. Palpi extremely short. The number of their joints could not be ascertained. Thorax small and short, with a very distinct promesonotal but no mesoëpinotal suture; epinotum unarmed. Petiole nodiform, attached to the postpetiole by a very small, narrow surface. Postpetiole voluminous, larger than the first gastric segment, constricted behind, remaining gastric segments very small, almost completely telescoped into the first segment. Sting well-developed. Legs rather stout and short; hind tibiæ each with a single large, richly pectinated spur; tarsal claws simple, slender and straight. Sculpture and pilosity rather coarse.

Female. Ergatoid and differing from the worker only in having an anterior ocellus and in the larger size of the postpetiole and first gastric segment, and in the latter being as large as the former.

Paranomopone relicta sp. nov.

Worker. (Figs. 1–4). Length 4–4.5 mm.

Head, excluding the mandibles, scarcely longer than broad, distinctly narrower in front than behind, with broadly and rather deeply excised posterior border and prominent posterior corners, its sides rather straight, its upper surface convex, the gula flattened. Mandibles with slightly convex external borders and about 7–8 subequal teeth on the apical borders. Clypeus flat, with a sharp median carina, anteriorly very slightly projecting as a short lobe with straight median border and rounded corners. Antennal scapes about three-fourths the length of the head; first funicular joint about as long as broad: joints 2-8 decidedly broader than long; first and second joints of club subequal, each about as long as broad and together distinctly shorter than the terminal joint. Thorax narrower than the head, broadest through the pronotum, which, seen from above and excluding the neck, is nearly twice as broad as long, broadest in front, with the humeral and inferior angles sharp and pointed. Promesonotal suture very sharp and distinct; mesoëpinotum from above less than twice as long as broad, its sides feebly concave, in profile scarcely longer than high, with the base of the epinotum convex and somewhat longer than the declivity, which is concave and sloping and has a distinctly crenulate margin on each side. Petiole from above broadly elliptical, slightly broader than long, with rounded sides; in profile as high as the thorax, about one and three-fourths times as high as long, with straight and perpendicular anterior, convex and horizontal superior and concave and perpendicular posterior surface. Ventral surface with a small tooth near its anterior border. Postpetiole from above and from the side rounded, as broad as long, broader and longer than the first gastric segment, which is rather cylindrical and encloses the small remaining gastric sements. There is a small blunt tooth at the anterio-ventral margin of the postpetiole.

Rather shining; mandibles smooth, sparsely and rather coarsely punctate. Clypeus with a few sharp longitudinal rugæ on the sides. Head between the frontal carinæ and medial borders of the scrobes traversed by about seven sharp longitudinal rugæ on each side of the median line, which is itself represented by a ruga continuous anteriorly with the median carinula of the frontal area and the clypeal carina. The rugæ diverge on each side of the middle line and there are shallow, elongate punctures in the interrugal spaces. Cheeks also with similar, but more reticulate, coarse rugæ. On the occiput and posterior corners of the head the longitudinal rugæ are replaced by very coarse punctures or foveolæ, so close together that the spaces separating them are converted into reticulate rugæ. Thorax, petiole, postpetiole, and first gastric segment finely punctate and covered with foveolæ similar to those on the occiput but distinctly sparser on the postpetiole and gaster. Epinotal declivity, posterior declivity of petiole, scrobes of the head and a portion of the mesopleuræ glabrous and very shining, the scrobe also slightly striolate. Antennæ, legs and terminal gastric segments subopaque, finely and densely punctate.

Hairs and pubescence rather coarse, grayish yellow; the former long, erect, of unequal length, covering the body, legs and scapes and quite as long on the extensor surfaces of the appendages as on the body. Pubescence long and appressed on the body, most distinct on the gaster and postpetiole, finer and denser on the legs and antennal scapes.

Head, thorax and petiole dark brown or piceous above; mandibles, clypeus, antennæ, pleuræ, legs, sides of petiole and the whole of the postpetiole and gaster richer brownish red.

Female. (Figs. 5 and 6.) Length 5.5 mm.

Differing from the worker only in the shape and size of the abdomen, the postpetiole and first gastric segment being larger and the latter as broad as the petiole and fully as broad as long. These segments are of the same dark brown color as the head and thorax, whereas the remaining gastric segments are paler brownish red, like the legs, antennæ and mandibles.

Described from a single female and two workers taken October 28, 1914, under a large rotten log in the moist tropical "scrub" at Kuranda in Northern Queensland. These specimens with a few nearly full-grown larvæ apparently comprised the whole colony. The larva (Figs. 7 and 8) is rather slender, pure white and covered with delicate white hairs, which are short and rather dense, especially on the dorsal surface, and interspersed with fewer, longer and more flexuous hairs. The head is rounded, sparsely hairy and bears a pair of well-developed, tridentate mandibles.

Paranomopone has all the ear-marks of being a very ancient, possibly Mesozoic genus, which still survives as a very rare relict in tropical Queensland. It is difficult to assign it to a definite position in any of the existing tribes of the subfamily Ponerinæ as enumerated and defined by Emery in the "Genera Insectorum." In the structure of the thorax and abdomen there is considerable resemblance to the peculiar Haytian genus *Emeryella* Forel among the Ectatommiini, but the deep scrobes of the head are unlike anything seen in other known Ponerine genera. *Paraponera*, to be sure, has scrobes, but these are of a very different conformation, being angulate and enclosing the eye in such a manner that the scape lies over, and the funiculus under the eye, when the antenna is folded back against the head, whereas in *Paranomopone* the whole scrobe is above the eye. In other respects the head shows close affinities with the Ectatommiini, so that, on the whole, I am inclined to assign it to this tribe. The peculiar ergatoid female is of unusual interest in connection with similar females of the genera *Onychomyrmex* and *Leptogenys* and the apparent absence of definite female forms in some of the other Australian ant-genera, notably *Rhytidoponera* sens. str., *Diacamma* and *Leptomyrmex*.

EXPLANATION OF THE PLATE.

Fig. 1. *Paranomopone relicta* sp. nov. Worker in profile.
Fig. 2. Head of same seen from above.
Fig. 3. Thorax and abdomen of same seen from above.
Fig. 4. Antenna.
Fig. 5. Female (ergatoid), in profile.
Fig. 6. Thorax and abdomen of same seen from above.
Fig. 7. Nearly full grown larva.
Fig. 8. Head of same from above.

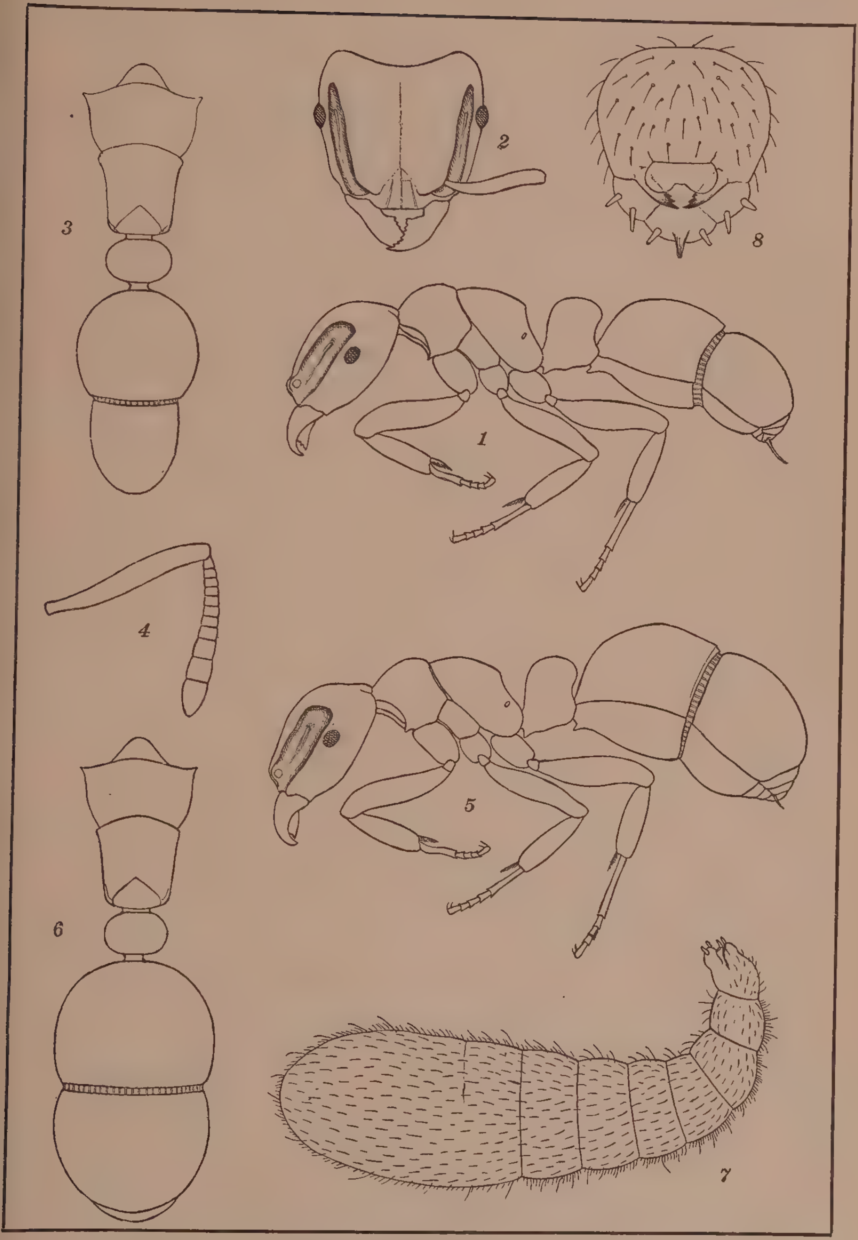
NOTES ON THE EXTERNAL ANATOMY OF *BOREUS BRUMALIS* FITCH.[1]

By S. M. Dohanian.

In December, 1914, and January, 1915, a score or more of *Boreus brumalis* Fitch were found by Mr. Richard Mead in Weston, Mass., near the base of an oak tree. Another was found by the writer during the latter part of January in the Arnold Arboretum, Jamaica Plain, Mass., on melting snow near a brook. Investigation of this curious and interesting insect has called attention to

---

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 97.



Wheeler—*Paranomopone.*

the fact that very little is known about its habits and that it has never been carefully figured. To fill this want and to avoid such confusion in the identification of the members of this genus, as has recently occurred among a group of amateur entomologists in Germany,[1] the writer has undertaken to figure *B. brumalis* Fitch as carefully as possible and to redescribe it from the many specimens available, particularly as these show certain variations from the original description of Fitch.

The genus Boreus, first described by Latreille in 1825, contains ten or eleven recognized species. Of these only four are to be found in the United States, two in the eastern and two in the western parts of the country. The remaining ones are distributed over Europe and Asia.

Boreus brumalis was described many years ago by Asa Fitch (1847), accompanied by some notes on its occurrence in New York state. At the same time he described a second species, *B. nivoriundus.* Fitch's paper contains the first reference to the occurrence of Boreus outside of Europe. Both of the above species are to be found in New England, as there are in the collection of the Boston Society of Natural History specimens[2] from Jackson, N. H., Medford, West Roxbury and Stoneham, Mass., to which should be added also Weston and Jamaica Plain, Mass.

The life history as yet has not been worked out completely for any of the species of the genus, but they are all believed to be predacious on other winter insects and also those found hibernating under mosses, stones, etc. Friedrich Brauer, having found some larvæ of *B. hyemalis* L. in moss in 1856, believes that the life cycle covers a period of one year: the imago appears about the middle of October and remains in the adult state through the winter until April of the following year; early in the summer, about June, the larvæ hatch, undergo a rapid development, and remain in the full grown condition until the end of the summer; then they pupate and emerge as adults very soon thereafter; these are at first rather pale-colored and immature, an observation which is corroborated by both Dalman and Stephens from immature adults that were found by them in England under stones and moss (Westwood: Introd. Mod. Class. Ins., II, p. 54).

---

[1] Entomologisches Jahrbuch für 1915, 24 Jahrgang, pp. 141–143.

[2] Mr. C. W. Johnson very kindly loaned these specimens to the writer.

Although they are saltatorial, their legs are not developed as are those of Orthopterous insects. The legs are extremely slender and long, the hind pair decidedly longer than the total length of the body.

Boreus brumalis Fitch.

Female. Length 3–3.75 mm., including ovipositor; polished, deep black-green; legs, antennæ and rostrum black and polished, but reflecting the light very feebly; ovipositor brilliantly polished, pure black. Antennæ inserted near the middle of the front, their bases nearer to margin of eyes than to each other; filiform; 2.15 mm. long; 22-, sometimes 23-jointed; the basal and second joints stout, slightly longer than wide; other joints one and one-half times as long as wide, gradually decreasing in length, but not in width, as the tip is approached so that the penultimate joint is about as long as it is wide; terminal joint ovate. Ocelli absent. Eyes bare; black; bulging out prominently, and extending back to the prothorax. Rostrum black, long-conical; twice as long as the head from which it gradually tapers; sparsely covered with light hairs; supra-clypeal piece just below the antennal cavities; maxilla with horny base, bearing six, short, transverse spines, serrate-spinose apically; maxillary palpi four-jointed, reaching beyond tip of beak; covered with long, light hairs, except last joint, which is the longest and slightly thicker than the others, long-ovate, bare. Labrum flat, more than four times as wide as long, but somewhat constricted in middle; labial palpi one-jointed, with a tuft of hair at tip. Mandibles bidentate, and rather sharp. Prothorax wider than long; coarsely, transversely striate; with an oblique groove extending from each anterior angle and meeting medially near the posterior border to form one, continuous, broad, U-shaped groove; a row of long, black hairs on both anterior and posterior margins. Mesothorax narrow, pubescent. Metathorax as long as prothorax; divided into three parts by two, deep, transverse grooves, which extend down the sides to the coxæ; middle portion much narrowed, allowing the small, round, first abdominal segment to protrude. Abdomen consisting of eight segments, tapering so that the last forms a part of the ovipositor; oval; segments distinctly marked by strongly impressed, transverse lines; the first segment small and partly hidden by the metathorax; all segments densely covered with fine, white, appressed hairs, especially behind. Ovipositor 0.8–1.0 mm. in length; composed of three segments, the middle piece the largest; brilliant black; sheathing style issuing from the seventh abdominal segment, shorter than the ovipositor; finely serrated on its apical third. Legs extremely long and slender, densely clothed with minute hairs; front legs as long as abdomen and ovipositor together, middle legs one and one-third times as long as front legs, and hind legs one and one-third as long as middle legs. Tibiæ with a pair of short spines at tips; posterior half of tibiæ and all tarsal segments with small, short spines. Tarsi five-jointed, the first joint as long as the next three, the second as long as the third and fourth together; the fifth terminated by a pair of small, slender, simple claws. Front wings merely scales; less than 0.2 mm. long and about as wide, with a median longitudinal ridge; tuberculate and set with very

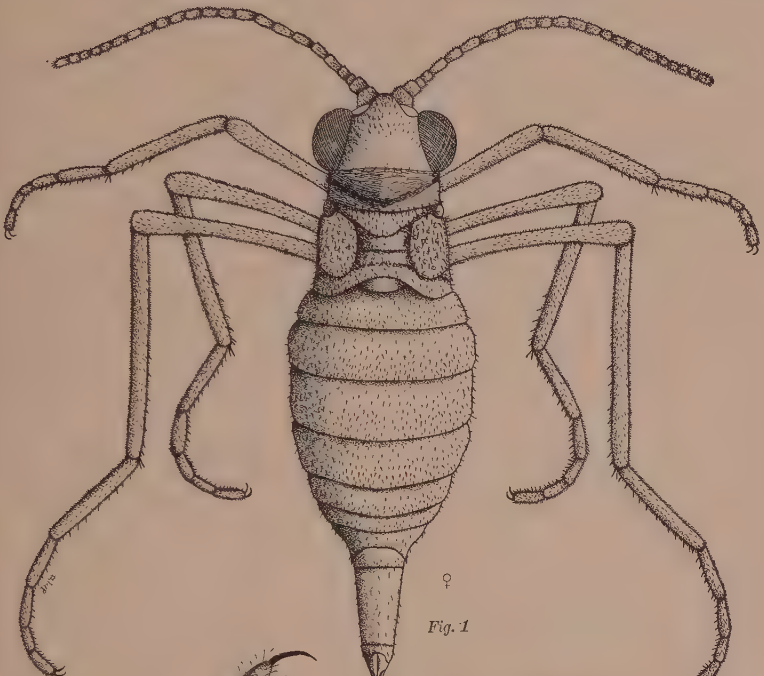


Fig. 1

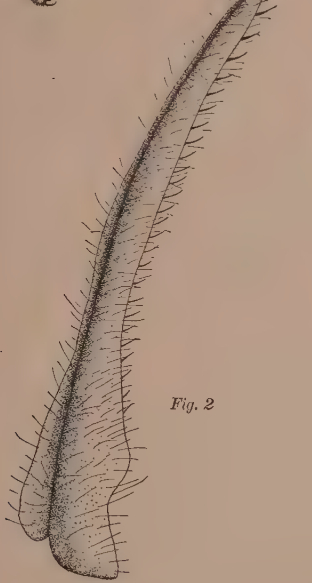


Fig. 2

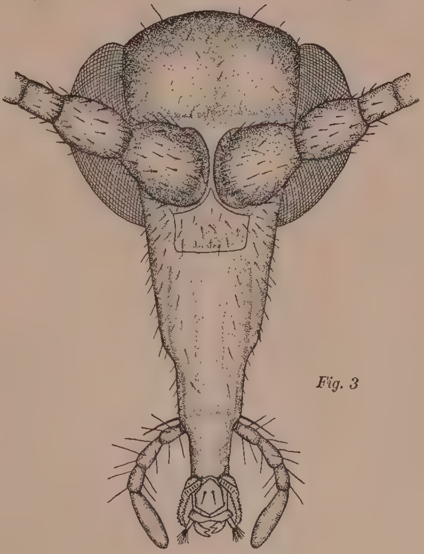


Fig. 3

DOHANIAN—*Boreus.*

short, erect hairs; hind wings degenerated into microscopic dots of the same shape as fore wings.

Male. Length 2.50–2.85 mm. Antennæ 23-, sometimes 24-jointed. Front wings 1.7 mm. long, 0.4 mm. wide at base when laid open flat; coriaceous; gradually narrowing toward the tip from which there issues a long, thorn-like spine; upper surface metallic, lustrous, sparsely pubescent; prominent spines issue from both sides of the trough-shaped wing into which the long, slender, chitinous hind wing fits snugly. Hind wing almost a bristle, its extremely sharp tip scarcely projecting beyond that of the fore wing; underside with a thick row of white, woolly pubescence; upper surface glabrous. Abdomen cylindrical, comparatively broader than in the female; the last four segments crowded dorsally and broadened ventrally so as to allow the genitalia to recurve upon the back, and the two prominent, stout, sharp-pointed hooks, each with an acute tooth in the middle of its inner edge and pilose along the outer edge, to point toward the head.

LITERATURE.

1. Fitch, Asa. Winter Insects of Eastern New York. Amer. Journ. Agric., Vol. V, pp. 275–277. (1847.)
2. Trans. Entom. Soc. London, 2d series, Vol. I, p. 96. (1850.) Reprint of reference No. 1.
3. Lintner, J. A. 2d Rep't Ins. New York, pp. 237–238. (1885.) Reprint of reference No. 1.
4. Hagen, H. A. Neuroptera of North America. Smithsonian Misc. Coll., Vol. IV, p. 240. (1862.)
5. Brauer, F. Beiträge zur Kenntniss der Verwandlung der Neuroptera. Verh. Zoöl.-bot. Vereins, Vol. VII, pp. 69–70. (1857.)
6. Packard, A. S. Taste Organs and Olfactory Rods. Psyche, Vol. V, pp. 160–164. (1889.)
7. Packard, A. S. Catalogue of the Phalænidæ of California. Proc. Boston Soc. Nat. Hist., Vol. XIII, p. 408. (1871.)
8. Hine, J. S. A Review of the Panorpidæ of America North of Mexico. Bull. Dennison Univ., Vol. XI, pp. 254–256. (1901).
9. Cockle, J. W. The Mating of *Boreus californicus*. Canadian Entom., Vol. XL, p. 101. (1908.)
10. Cobelli, R. de. Kleinere Original-Beiträge. Zeits. wiss. Insektenbiol., Vol. IX, p. 132. (1913.)

EXPLANATION OF PLATE 9.

Boreus brumalis Fitch.

Fig. 1. Dorsal view, female.
Fig. 2. Wing of male.
Fig. 3. Front view of head.

NOTES ON THE CAT FLEA (*CTENOCEPHALUS FELIS* BOUCHÉ).[1]

By Harold Lyon.

The following observations were made in connection with some attempts during the past winter to devise a satisfactory method for the propagation of fleas to be used for experimental purposes. It had been intended to make use of the reared insects for experiments concerning their possible association with anterior poliomyelitis (infantile paralysis), but as it was not possible to secure proper facilities for this work at that time, it has seemed advisable to publish earlier some of the observations.

These relate primarily to the seasonal abundance of the cat flea, since it is difficult to obtain from existing literature any adequate data upon the relative abundance of fleas during the various months of the year, in regions where there is a considerable annual range of temperatures. The association between bubonic plague and various fleas, particularly the tropical rat flea (*Xenopsylla cheopis*) has long been known as well as the rôle of *Ceratophyllus fasciatus* in transmitting plague in the more temperate regions of the northern hemisphere. However, most of the work on plague and fleas has been done in the tropics or subtropics and the careful data collected in such climates cannot be applied to the conditions which exist in our own region. Observations on the seasonal prevalance of *Ceratophyllus fasciatus* have been made notably in England by Nuttall and also in California by Mitzmain, but none seemed sufficient for the present purpose. It was therefore determined to make a uniform series of counts of the number of fleas occurring on cats in the city of Boston from week to week during as long a period as possible. With the kind permission of Mr. Huntington Smith of the Animal Rescue League, it was possible to examine the cats collected by the officers of the league and these examinations have formed the basis for the accompanying tabulations. The data on seasonal distribution begin with December 1914 and have continued to the present date of writing.

---

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 96.

Soon after the animals had been killed, their fur was carefully gone over with a fine-toothed comb and the fleas present on each were counted. As the time was limited, five cats were chosen as a unit. These were selected at random and the lot contained both homeless and strayed pet cats. The extent of infestation varied greatly, but contrary to expectations seemed to be as great in the pets as in the homeless ones. No doubt, more fleas could have been obtained from individual cats if it had been possible to examine each animal exhaustively, but as all were gone over with the same thoroughness, the conclusions as to the comparative abundance can be regarded as trustworthy.

The data obtained have been summarized in the following table:

Number of animals examined	139
Number of animals with fleas	114
Number of animals without fleas	25
Total number of fleas	590
Greatest number per cat	30
Smallest number per cat	1
Average number per cat	4.24

Monthly Average per Cat.

December	3.75
January	3.85
February	2.3
March	1.08
April	2.52
May	3.1
June	3.98
July	10.05

A number of very interesting facts are brought out in the table, and some are rather different from what had been anticipated. It is, of course, common experience that fleas are less abundant in the winter than in the summer, but so great a variation had not been expected, since the adult insects would not seem to be greatly affected by temperature, living as external parasites of a warm blooded animal. The larvæ are, of course, subjected to a much greater range of temperature, as they live in the nest of the animals which they infest or in accumulations of dust and animal refuse nearby. This probably accounts for the late appearance of considerable numbers of fleas in the spring, while their persistence well into the winter may be due to the continued warm environment of the adults on the body of their host after the onset of cold weather.

Some years ago Conn of the Connecticut State Board of Health (*Rept. State Bd. Health*, Conn., 1910–11 (1912) suggested a possible etiological connection between fleas and anterior poliomyelitis, but others have not been able to harmonize the persistence of fleas through the winter with the very slight incidence of poliomyelitis during this part of the year. Thus, in considering any possible insect carriers of this disease, Brues and Sheppard (*Journ.*

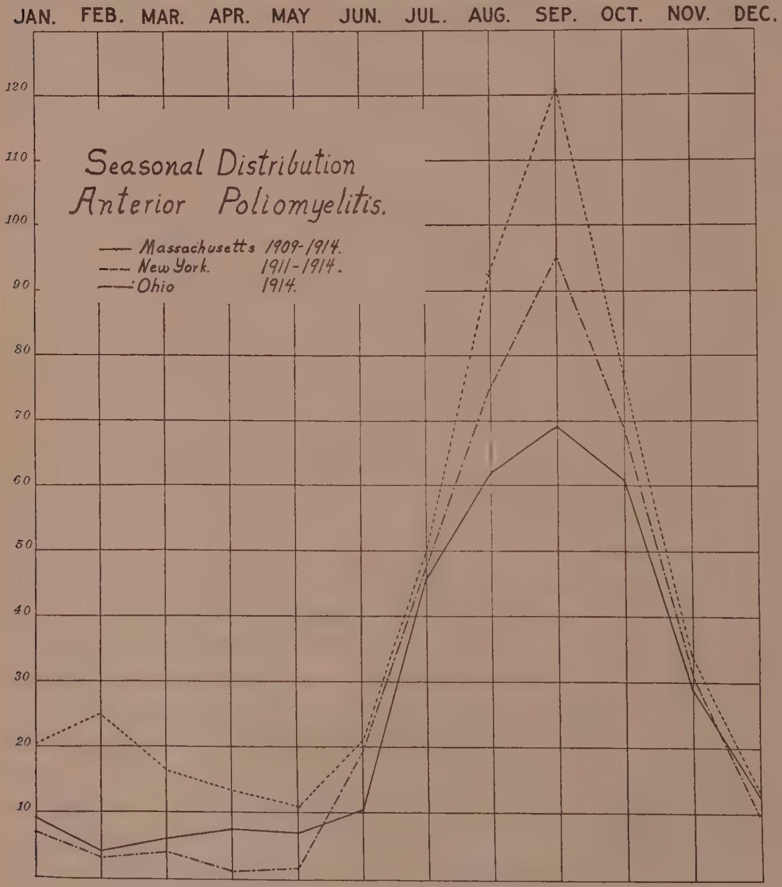


Table 1. Seasonal Incidence of Anterior Poliomyelitis in Massachusetts, New York and Ohio.

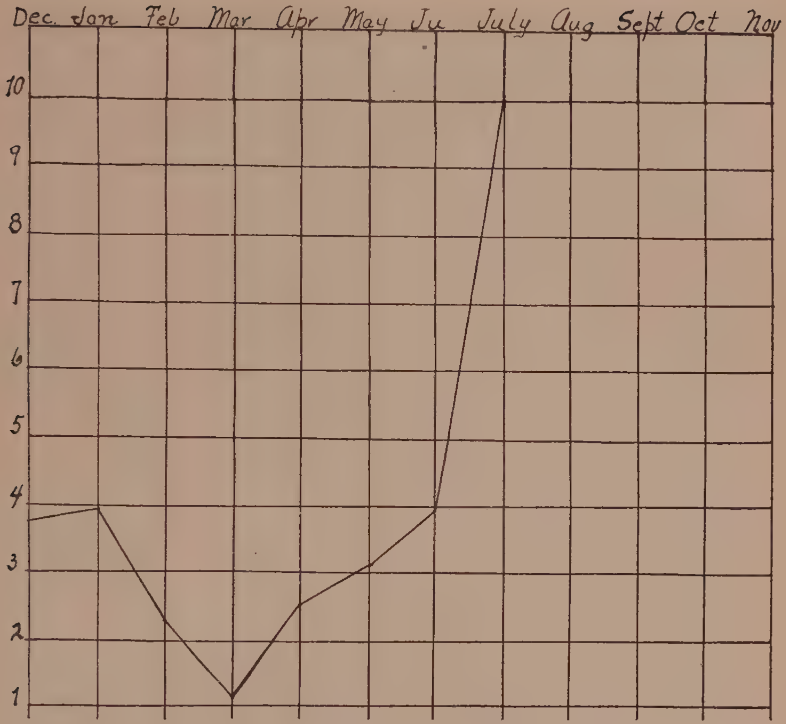


Table 2. Seasonal Abundance of the Cat Flea (*Ctenocephalus felis*).

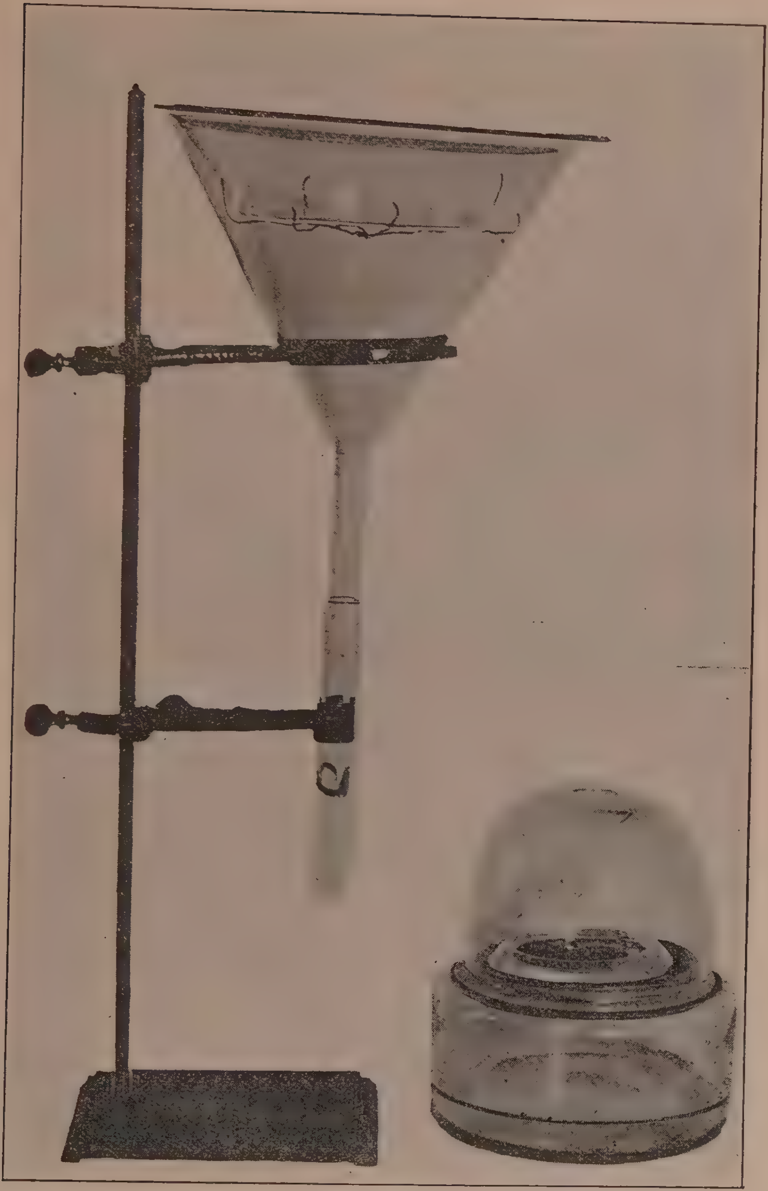
Econ., Ent., Vol. 5, p. 314 (1912) were led to disregard fleas for this reason. The present data show, however, that in a climate like that of New England the seasonal prevalence of these insects agrees, in some respects at least, quite well with the seasonal incidence of the disease. The relationship which exists is shown graphically in the following tables (Tables I and II), in which are observed the abundance of the cat flea and the reported incidence of poliomyelitis. The data concerning the disease have been collected from a number of sources and relate to several states so as to minimize, as far as possible, any irregularities which might arise from the small numbers of cases reported during the winter months.

In the reports of the Massachusetts State Board of Health on Infantile Paralysis for the years 1907–1912, we find the following information bearing directly on the question. As the majority of the domesticated animals may harbor fleas of various species, we find that in 1909–10 out of 328 families where the disease was reported, there were no animals present in 131 cases, that there were animals present in 197 cases and that 125 animals had sickness or death in 70 of the families. In this instance there were animals present in 60 per cent. of the families. Again in a later report we find that "out of 186 families in which acute epidemic poliomyelitis occurred, 34 homes had illness, paralysis or death in 82 animals. One hundred and ten of the families above mentioned had animals; therefore, about thirty per cent. of 110 families with animals, had paralysis or death in their animals." All animals in this case except two may bear fleas. Again, out of 33 cases, all of which had animals present, there were 28 cats and dogs in the home. It was also reported that out of 328 families where vermin, insects, rodents, etc., were present, there were 224 with rodents, which are common hosts of fleas.

METHOD OF RAISING FLEAS.

The adult fleas after each combing were brought to the laboratory and various trials were made to keep them alive but under no condition, moist or dry, did they live after five days. As this would not do for obtaining material for experimental purposes two cats infested with fleas were secured and these were kept in the insectary until the last of May when they were placed out of doors. Their bed consisted of several layers of newspapers which were shaken every few days into a dish, and thus from fifty to one hundred eggs were obtained each time.

The following method proved most successful in raising fleas from the eggs. The eggs with the débris, etc., from the beds, were put in Petri dishes and these placed on the stage in small moistening jars, one-third full of water (Plate X). The cover was put on the jar and the whole apparatus placed out of the direct light in the laboratory at ordinary room temperature. On exceptionally warm days the jar was partly opened to prevent the condensation of moisture in the jar from drowning the larvæ. A little floor sweepings from a vacuum cleaner and sometimes a little dried blood were added to the culture. The larvæ seemed to prefer the dust and their own molt skins to the dried blood. By this method



LYON—*Cat Flea.*

we were able to raise a generation, from egg to imago, in thirteen days as the minimum to thirty-three days as the maximum, depending upon the temperature. Moisture is essential for good results.

TABLE SHOWING TIME OF DEVELOPMENT.

Egg.	*Larva.*	*Pupa.*	*Complete generation.*
2–8 days	7–18 days	2–14 days	13–33 days

In order that we might easily collect the adults on emerging, the following device was used. After the larvæ had pupated (in pupating, the larvæ may spin a thin cocoon or may pupate without doing so, in either case the pupa stage is the same), the whole culture was suspended in a glass funnel, deep enough down to leave a clear space around the sides and not touching a glass plate cover which was placed over the top of the funnel. The tube of the funnel was inserted in a test tube and the entire apparatus attached to a ring stand. The fleas on emerging from the pupa jumped about and finally fell into the funnel and slid into the test tube below, where they could be easily collected and handled (Plate X).

OBSERVATIONS ON THE ANATOMY OF THE LARVA.

The statements and figures of the earlier authors, Laboulbène, Künckel and Taschenberg, are very indefinite but form the basis of most of the later work. In the first larval stage, the head is considerably longer than the other segments but in the last, third stage, it is of the same size. The egg breaker is lost after the first molt but the mouthparts remain the same.

The broad convex upper lip or labrum of the mouth of the cat flea is slightly emarginated in the middle with two small setæ at the center of either lobe (Fig. 1 C.) There are also two small hairs on either side. The labrum is used extensively in locomotion and in connection with the rest of the head to lift and turn over particles of food and in burrowing. In locomotion the two small setæ or bristles are fastened into the surface upon which the lava may be, and act as a brace while the "caudal stylets" at the extremity of the body are being placed in preparation for exerting the power to force the body forward. The labrum is then relaxed and the larva darts forward in a rapid wriggling motion. On the under side of the labrum is a curved row of bristles which partially line the upper surface of the mouth and when closed meet the bunches of bristles on the ends of the maxillæ, thus holding the food in place in front of the mandibles.

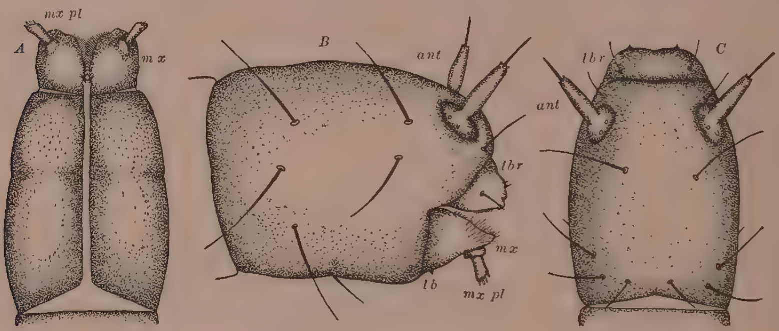


Fig. 1. *Ctenocephalus felis,* head of larva: *A,* ventral view; *B,* lateral view; *C,* dorsal view; *ant.,* antenna; *lb.,* labium; *lbr.,* labrum; *mx.,* maxilla; *mx. pl.,* maxillary palpus.

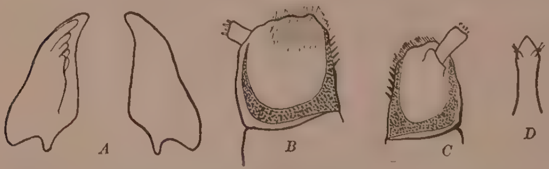


Fig. 2. *Ctenocephalus,* mouthparts of larva. *A,* mandibles; *B,* maxilla from inner side; *C,* maxilla from outer side; *D,* labium.

The biting mandibles (Fig. 2 A), which are situated well inside the mouth, are strongly chitinized, broad and triangular and seem to be very powerful for such a larva, appearing more like those of Coleoptera than Diptera. The outer small end tapers gradually back and ends in a broad base with a single large lobe. The teeth appear, when the mandibles are in normal position, to be situated, not on the inside edge but somewhat back and on opposite sides of each mandible. Thus, when the two mandibles are closed, they overlap each other. The teeth, six in number, are blunt and not sharp, as Künckel states, nor do the mandibles end in a sharp point. The lobe at the base of the mandibles serves for the attachment of muscles and as a pivot by which they are moved.

Künckel describes the maxillæ (Fig. 2 B and C) as being sectors of a circular saw with the teeth on the greater part of their outline; Taschenberg, as being sickle-shaped on the outer edge, circular in shape on the inner edge which is provided with numerous fine teeth. The two maxillæ are provided on their inner cutting surfaces with five sharp-like saw teeth which point upwards. On the ends of the maxillæ are clumps of fine bristles or "brushes." These work against the curved line of hairs on the roof of the mouth. The bristles on the outer surface of the maxillæ interlock when in normal position. In the basal portion of the maxillæ, is a part, more heavily chitinized than the rest, which tapers up into a point on either side. Perhaps this is the sickle-shaped affair of Taschenberg. This is evidently a brace for the maxillæ, providing a suitable support for the attachment of muscles at the base and for the support of the palpi, which are two-jointed. The basal joint is short, broad and higher at one end than at the other. The second joint is short and stout, enlarging at its tip an oblique, flat end, bearing five small papilliform processes of unequal length which radiate somewhat.

The labium is situated well under the head (Fig 2 D). Laboulbène says that it is boat-shaped and divided in front, with two palpiform lobes. Künckel says that it is tongue-shaped with two very fine points making it bifid, having at its base two humps provided with two long and two short bristles. The labium is very small, narrow, slightly swelling near the end, with a blunt point which is turned upwards. Its bifid appearance is due to the presence of the labial palpi which are situated just back of the tip on the slightly enlarged portion and not at the base of the labium. The palpi consist of a short thick basal joint with four stout bristles, two of which are short and appear almost together, while the other two are longer and spreading. Like the terminal bristles of the antennæ, they do not taper. The base of the labium appears to end in the suture which extends medially the full length of the under side of the head.

In conclusion I wish to thank Professor C. T. Brues for his help in preparing the introduction and for the kindly interest which he has shown during the entire work.

REFERENCES.

Laboulbène, A. (1872.) Métamorphoses de la Puce du Chat (*Pulex felis* Bouché). Ann. Soc. Ent. France, Ser. V. II., 267–274.

Künckel. J. (1873.) Observations sur les Puces, en particulier sur les Larves des Puces du Chat et du Loir (*Pulex felis* et *Pulex fasciatus*). Ann. Soc. Ent. France., Ser. V. III, 129–142.

Taschenberg, O. (1880.) Die Flöhe. Halle, pp. 122.

Packard, A. S. (1894.) On the Systematic Position of the Siphonaptera, with Notes on their Structure. Proc. Boston Soc. Nat. Hist., XXVI, 312–355.

Mitzmain, Maurice B. General Observations on the Bionomics of the Rodent and Human Fleas. U. S. Public Health Bull., No. 38, 1910.

Russell, Harold. The Flea. Cambridge, 1913.

Bacot, A. W. and Ridewood, W. G. Observations on the Larvæ of Fleas. Parasitology, Vol. 7, No 2, June, 1914.

Infantile Paralysis in Massachusetts, 1907–1912.

Monthly Public Health Bulletins, Mass, 1909–1915.

THE STIMULI WHICH CAUSE THE EGGS OF THE LEAF-OVIPOSITING TACHINIDÆ TO HATCH.

By Henry H. P. Severin, Harry C. Severin and William Hartung.

Some difference of opinion exists as to the stimuli which cause the eggs of the leaf-ovipositing Tachinidæ to hatch. The eggs of the leaf-ovipositing tachina contain fully developed larvæ at the time of deposition and are ready to hatch when swallowed by the host. Townsend (4, p. 109) suggests "that the digestive juices and conditions which the egg encounters in the alimentary canal of the caterpillar act upon the chitin and cause the shell to weaken so as to release the maggot." In direct opposition to this view, Swezy (3, p. 29) writes as follows: "The shell of the egg is so hard that it seems unlikely that it could be sufficiently affected by the digestive juices of the caterpillar, quickly enough to allow the maggot to escape from the egg, and also have time enough to pass through the wall of the alimentary canal before it would be carried along and be expelled with the frass of the caterpillar." Swezey (2, p. 8) first ventured the opinion that the eggs "are so small as to escape being injured by the jaws of the caterpillar in biting off bits of leaf," but in a later paper (3, p. 30) he changed his view and believed that the mandibles of the host crack the egg-shell, allowing the maggot to escape. It appears to us that Swezey's explanation of the method of hatching of the egg is faulty in some respects. If the jaws of the host were to exert too much pressure upon the egg-shell the maggot would be crushed. Again, by what mechanism would those eggs hatch which were swallowed, but did not first have the chorion cracked by the mandibles of the host?

In order to obtain the eggs of the same species of tachinid (*Chætogædia monticola* Bigot) with which Swezey worked, a careful study of the egg-laying habits of this insect under natural conditions was made in the Hawaiian Islands. The fly usually deposits its eggs on different species of grasses and weeds. In observing the behavior of the parasitic fly, one is at first inclined to believe that the female searches for cutworms in the grass. The insect often crawls down into the thick matting of grass and disappears. Sooner or later it reappears, crawls up a blade of grass and stops a moment to deposit an exceedingly minute, black egg. As the tachinid crawls towards the tip of the blade of grass, the leaf bends, and it then grasps another blade of grass, crawls down, stops a moment to oviposit and again it may disappear in the thick matting of the grass. Occasionally the creature may rest to go through cleaning movements or to lap up some food. Often Chætogædia takes short flights, only to resume egg deposition in a new locality. When disturbed, it flies away with a loud buzz, so quickly that the eye can hardly follow it.

To obtain the eggs of this leaf-ovipositing tachinid, specimens of Chætogædia were captured in the field and placed in a glass jar provided with a cover. The bottom of the jar was covered with moist filter paper on which was placed a wet sponge. The cover was propped up with a toothpick to allow circulation of the air and thus prevent the accumulation of moisture on the sides of the jar. The food that was placed in the jar consisted of the pulp of ripe bananas and sugar. Under these conditions the flies deposited hundreds and hundreds of eggs on the moist filter paper. The pulp of the banana seemed to be especially attractive as a medium for egg-laying, for the fruit was often blackened by hundreds of tiny eggs.

A number of experiments were performed to determine whether the eggs of the leaf-ovipositing tachinid would hatch in the juices emitted from the mouths of a number of its hosts. The bodies of army worms (*Heliophila unipuncta* Haw.) were seized between a pair of broad, pronged forceps, whereupon the larvæ ejected through the mouth a green liquid which was accumulated in a concave, center slide. One hundred eggs which had been deposited on moist filter paper by Chætogædia were emersed in this green fluid. The liquid containing the eggs was covered with a cover glass, care being exercised that no bubbles of air remained beneath the cover glass. In less than one minute some of the eggs began to hatch. Three hours later the larvæ were counted and it was found that ninety-seven of the one hundred eggs had hatched. The green liquid was tested with litmus paper and gave a decided alkaline reaction. The eggs of *Chætogædia monticola* also hatched in the akaline juices exuded from the mouths of the following hosts: *Vanessa cardui* Linn. and *Plusia chalcites* Esp.[1]

A similar experiment was performed with milkweed caterpillars (*Anosia plexippus* Linn.) from which the parasitic fly has not been bred, but the eggs hatched in the alkaline juices emitted from the mouth of the larvæ.

The eggs of this tachinid were fed to the imported cabbage worm (*Pontia rapæ* Sch.) and the larvæ of *Herse cingulata* Fab. (=*Sphinx convolvuli* Linn.) from neither of which Chætogædia has been bred. A few days later, these caterpillars were dissected and the parasitic larvæ were found embedded within the fat tissue of the body wall.

The next problem which we attempted to solve, was to determine in what part of the alimentary tract of the host the eggs of Chætogædia hatch. A caterpillar of the milkweed or monarch butterfly was fed a dozen eggs which had been placed upon a milkweed leaf. The caterpillar was vivisected immediately after the last egg was swallowed and three empty egg shells were found in the fore-intestine and nine in the mid-intestine. An army worm was vivisected and eggs of the parasitic fly were introduced into the lumen of the fore-intestine and mid-intestine. Under a binocular microscope, maggots were observed emerging from these eggs.

As there was a possibility that the digestive juices were regurgitated from the mid-intestine into the fore-intestine in the caterpillars used in the previous experiment, a host was selected which did not exude a liquid from the mouth when handled. Several mature, male walking-sticks (*Diapheromera femorata* Say) were fed bits of hazel-nut leaves upon which the eggs of a leaf-ovipositing tachinid (*Phasmophaga antennalis* Towns.) were glued. Each of two walking-sticks, which had swallowed twelve eggs of the parasitic fly, was injected with 95 per cent. alcohol three hours after feeding and was then dissected. All of the eggs were found in the fore-intestine at some distance in front of the œsophageal valve but not one of the eggs had hatched. Another specimen, which had swallowed seventeen eggs, was dissected five hours after feeding. In this case, nine eggs were found in the posterior region of the fore-intestine but none of these had hatched; eight eggs were taken out of the mid-intestine in the region of the glandular appendages and seven had hatched. Only one larva was found within the contents of the mid-intestine. Upon clearing and mounting the entire contents of the abdomen, it was found that six maggots had bored through the mid-intestine; four of these were embedded in the fat tissue of the body wall and two were found in the testes.

---

[1] *Chætogædia monticola* has been bred from fourteen different hosts in the Hawaiian Islands. "Kirkaldy (1, p. 49) reports a pupa of the butterfly, *Vanessa cardui* Linn. parasitized by this fly" and Swezey (1, p. 49) bred this tachinid from *Plusia chalcites* Esp.

The question naturally suggested itself, will the eggs of *Chætogædia monticola* hatch in an acid liquid regurgitated from the mouth of an insect? The liquid ejected from the mouth of a katydid gave an acid reaction, and eggs were emersed in this medium. A few minutes later one of the eggs hatched.

The blood of army worms was extracted and gave an acid reaction. From one hundred eggs emersed in this liquid, forty-five larvæ emerged. Of thirty-five eggs placed in the blood of the caterpillar of the milkweed butterfly only two hatched. It is evident than many eggs failed to hatch in the various acid media.

In another experiment the eggs of Chætogædia were emersed in the acid juices pressed from blades of grass upon which the fly deposited its eggs, but not one of the eggs hatched.

An attempt was made to hatch the eggs in a weak, alkaline solution of sodium hydroxide. After experimenting with a number of formulas it was found that 100 eggs emersed in a .1 per cent. solution of sodium hydroxide, eighty-five hatched and of the same number of eggs emersed in a .05 per cent. solution of sodium hydroxide seventy-two hatched. After the eggs had been emersed in these alkaline solutions for twenty-four hours, some of the larvæ, still enclosed within the vitelline membrane, protruded from the egg-shells. Sometimes the posterior part of the larva within the vitelline membrane protruded from the egg-shell, whereas in a normal hatching the anterior end pushes forth from the egg. Of the two hundred eggs emersed in the alkaline solutions, twenty-seven larvæ emerged from the vitelline membrane within thirty-six hours, ninety-seven within forty-eight hours and thirty-three within sixty hours. In the experiment with the alkaline juices regurgitated from the digestive tract of the army worms, the eggs began to hatch in less than a minute, and ninety-seven of one hundred eggs hatched within three hours.

Eggs were now emersed in distilled water and results were obtained which were similar to those derived from the use of dilute solutions of sodium hydroxide. It appears, seemingly, that increased turgidity causes the larvæ to emerge when the eggs are emersed in water or dilute alkaline solutions for thirty-six hours or longer.

Is there a physiological mechanism connected with the hatching of *Chætogædia monticola?* A little pressure exerted upon the eggs of this tachinid causes the maggot enclosed by the vitelline membrane to issue from the chorion apparently uninjured. If the larvæ within the vitelline membrane is emersed in the liquid exuded from the mouths of army worms, the process of hatching can readily be observed under a microscope. As soon as the maggot enclosed within the vitelline membrane is emersed in the liquid exuded from the mouths of the army worms, bodily contractions can be observed, in a minute or less the contractions become more energetic and one can readily see the segments move from the posterior to the anterior end of the larva resembling a peristalic movement. Next the larva turns the anterior end towards the flattened or attached side of the egg so that the jaws are near the posterior end of the abdomen. The maggot then attempts to cut the vitelline membrane with the sickle-shaped part of its jaws. Often the distal end of the jaws appear to slip on the inner surface of the membrane, but once the end of the jaws is pushed through the vitelline membrane, a single sweep of the head, and the jaws cut a longitudinal incision, through which the maggot makes its way out. In pushing out of the egg-shell, peristalic movements of the body segments are again evident.

Since many of the eggs of *Chætogædia monticola* hatch in less than a minute, Townsend's view that the digestive juices act upon the chitin and cause the shell to weaken is probably incorrect. In all probability the digestive juices of the host is perceived by the larva through the micropyle of the egg and immediately the larva endeavors to free itself from the egg.

BIBLIOGRAPHY.

1. Swezey, O. H., 1907. The Sugar Cane Leaf-Roller (*Omiodes accepta*) with an Account of Allied Species and Natural Enemies. Rept. Exp. Sta. Hawaiian Sugar Planters' Assoc., Div. Ent. Bull. 5, pp. 1-61.
2. Swezey, O. H., 1908. Observations on the Life History of *Chætogædia monticola* Bigot. Proc. Hawaiian Ent. Soc. II, No. 1, pp. 1–35.
3. Swezey, O. H., 1909. Army Worms and Cut Worms on Sugar Cane in the Hawaiian Islands. Rept. Exp. Sta. Hawaiian Sugar Planters' Assoc., Div. Ent. Bull. 7, pp. 1–32.
4. Townsend, C. H. T., 1908. A Record of Results from Rearings and Dissections of Tachinidæ. Bull. U. S. Dept. Agric. Bur. Ent. Tech. Ser., No. 12, Pt. VI, pp. 93–118.

A QUESTION OF SYNONOMY.

By C. S. Ludlow,
Army Medical Museum, Washington, D. C.

For some time an Anopheline found in the eastern tropics has been accumulating names in a most unfortunate way, and as the mosquito is proven a very active carrier of malaria, and I myself am partly to blame for this multiplication of names, it seems fit I should try to untangle the synonomy.

When the study of Philippine mosquitos was in its infancy there was sent in to me an Anopheline which, according to the only authority available at the time,[1] seemed to be *Anopheles funestus* Giles. This anopheline is common in the Islands and was early seen to be so usually collected in connection with the report of malaria that in 1908[2] I noted "is taken always when malaria is present or prevalent" and this was so conspicuous that I stated "one specimen in a collection is enough to lead to a suspicion that malaria is present, and even a small number of them is usually accompanied or immediately followed by new cases, the number (of cases) depending largely on the prophylactic control of the station."[1]

---

[1] Giles G. M., Gnats or Mosquitos, 1st edition.

[2] Ludlow, C. S., Mosquitos of the Philippine Islands, the Distribution of Certain Species, and their Occurrence in Relation to Certain Diseases. 1908.

Nothing occurred to suggest to me that an error had been made in referring this species to *A. funestus* until the spring of 1912, when in discussing some Philippine mosquitos with Dr. Malcolm Watson, Chief Medical Officer, Estate Hospital Association, Klang, F. M. S., who was in Washington at that time, he called my attention to the fact that the dark species under consideration had a light ventral apical portion on the proboscis, and it seemed possible that it was an undescribed species. I gave Doctor Watson specimens of various Philippine mosquitos which he took to Mr. F. W. Edwards (British Museum) for confirmation of my naming, and at once wrote me that what I had called *funesta* Giles was really *christophersi* Theob. In the meantime I published a description of the dark specimens as *Myzomyia flavirostris.*

Mr. Edwards also kindly wrote me in regard to the matter, saying there could be no doubt as to the naming of the species, especially as Mr. Theobald's types in the British Museum were "fortunately in good condition. The type of *christophersi* has two broad apical bands like your *funesta.* On the other hand both *funesta* Giles and *listoni* Liston have female palpi with three narrow bands," and in a later letter writing in regard to specimens I had sent him, Mr. Edwards writes "'*M. funesta* Giles' and '*M. flavirostris* Ludl.' both, as you suggest = *christophersi.*"

In preparing the manuscript of "Bulletin No. 4, Surgeon General's Office" in 1913, as this species had heretofore been reported to the Medical Corps, U. S. Army as "*M. funesta,*" it seemed wise to retain the name and Giles description and add a footnote explaining the error which had occurred, and giving the correct name and synonomy, which, with the description of *flavirostris* immediately following, it was believed would make the matter quite clear.

It was therefore a surprise to find Mr. Banks had redescribed this species as *A. febrifer*[2] and that Messrs. Walker and Barber in their Article "Malaria in the Philippines" had referred to its connection with malaria as if that were quite unknown.[1] The footnote at the end of this article is also definitely misleading as I did not suggest that *christophersi* = *listoni*, but showed that whatever else the synonomy might be, it did not include *listoni*.

---

[1] The observations on which these statements were based began in 1901 and therefore covered several years.

[2] Banks, C. S., A New Philippine Malaria Mosquito. The Phil. Jour. Sc., Vol. IX., Sec. D., No. 4, Aug. 1914.

Dr. Marshal A. Barber sent me specimens of this mosquito for determination which reached me in beautiful condition, and there can be no doubt that it is the one I had wrongly referred to "*funesta*," that is, it is unquestionably *christophersi*.

The synonomy of this species as given by Mr. Edwards, and added to by myself and Mr. Banks is therefore—

Anopheles (*Myzomyia*) *christophersi* Theobald—*alboapicalis* Theobald, *mangyana* Banks, *funesta* Ludlow non Giles, *flavirostris* Ludlow, *febrifer* Banks.

The re-naming of this species by Banks is the more interesting because of the extreme amount of malaria among the Mangyans and that *Myzomyia mangyana* Banks was described in connection with a recognition of that condition.

In regard to *Anopheles rossi* Giles. As used by Banks it includes at least three forms—*Myzomyia ludlowi* Theobald, *Myzomyia indefinita* Ludlow, *Myzomyia parangensis* Ludlow, and is therefore nearly as confusing in the reduction of names as is the multiplication of names in the species previously considered.

It is easy to collect data concerning the relationship of these species, which have probably been more or less mis-comprehended.

Mr. Edwards writes me, in regard to specimens I had sent him marked "*M. rossi* or *indefinita?*" "I think I mentioned to you my conclusions on this subject but am not sure. They are that *indefinita* is a variety of *rossi* representing it in the Philippines and Malaya, the true *rossi* not occurring further east than India and Ceylon. These specimens, like all I have seen from the Philippines, are *indefinita*."

Christophers[2] says that though *N. ludlowi* rather closely resembles *Nsm. rossi* the "eggs of the two species are quite distinct," and Strickland[1] while not agreeing with Christophers on this point, after having given the differences in the two larvæ, says "the larva of *ludlowi* is therefore quite distinct from that of *rossi*" and in a footnote adds "As a certain amount of confirmation, we may note that if either *ludlowi* or *rossi* had hatched out of one of our breeding bottles, on examining the larvæ remaining in the bottles we found in *every* case, although we need not have expected such favorable evidence, that they were of the type which we now ascribe to the respective species."

---

[1] Walker, E. L. and Barber, M. A., Malaria in the Philippines. The Phil. Journ. Sc., Vol. IX., Sec. B., No. 5, Sept. 1914.

[2] Christophers, S. R., Malaria in the Andamans. Sci. Mem. by Off. of Med. and San. Depts., Govt. of India (new series), No. 56.

The description of *Myzomyia parangensis* has been comparatively lately published, but specimens were sent to Edwards for comparison before its publication and his verdict was "This is quite unlike any anopheline I have seen before. I suppose it comes nearest to *ludlowi*."

The *status* of these species seems to be that the anophelines taken in the Philippines which closely resemble *rossi* are really *indefinita*, and that *ludlowi*, and *parangensis* are established species.

When insects are connected with the transmission of disease it is doubly important that the nomenclature should be as unclouded as possible, and it is hoped the above points may clear some of the confusion which has existed concerning these species.[2]

DOES THE HOUSEFLY HIBERNATE AS A PUPA?

By Harold Lyon,
Bussey Institution, Harvard University.

The following experiments were conducted during the past winter to determine if it were possible for the housefly to overwinter in the pupal stage. Thirty-seven lots were obtained, each consisting of one hundred pupæ. These were buried in wet and dry sand, wet and dry loam, wet and dry horse manure and in leaf mould. These materials, together with the pupæ, were placed in large glass jars, covered with cloth and the whole divided into four series. One series was placed out of doors under sheltered conditions, one under exposed conditions, another in an unused greenhouse and the last in the basement of a large stone building.

---

[1] Strickland, C., The Comparative Morphology of the Anophelines *Nyssomyzomyia ludlowi* Theob. and *Nyssomyzomyia rossi* Biles. Bull. Ento. Research., Vol. V, Pt. 4, March, 1915.

[2] Since this article was sent to the publisher Mr. Edwards writes that "the name *christophersi* must be replaced by *minimus*, Theob. (described rather inaccurately from Hong Kong in 1901.)" The species was afterward referred to *Pyretophorus*, under which genus it is placed in Bull. No. 4, Surgeon General's Office, p. 46.

The experiments were started on October 19, 1914, and flies continued to emerge till December first from the jars stored in the basement. Two hundred and ten adults emerged from nine hundred pupæ, the greatest number coming from the dry manure, wet sand and wet manure. The temperature of the basement was about 60° F. during the entire winter.

In the unused greenhouse, which was somewhat warmer than out of doors, three hundred and sixty-four adults emerged from eleven hundred pupæ, the greatest numbers emerging from wet manure and dry sand. The last adult emerged on November twenty-fourth.

No adults emerged from the jars out of doors, although the weather was very mild, with the temperature only slightly lower than that in the unused greenhouse.

Observations were made daily and no adults emerged after December first. On June 23, 1915, the jars were opened and the contents examined. No parasites or fungi were found and the pupæ appeared perfectly normal, but on being broken open they were found to have completely dried out. This condition was observed in all the jars.

The results of these experiments, which represented quite natural conditions and the especially favorable conditions of the basement of the building, seem to indicate that the housefly can not easily overwinter as a pupa, although it can emerge until the middle of winter. It would seem, therefore, that the appearance of seemingly freshly-emerged adults in any considerable numbers during late winter and early spring should be accounted for in some other way.

VULTUROPS FLORIDENSIS, A NEW MEMBER OF THE PSOCID SUBFAMILY VULTUROPINÆ FROM THE UNITED STATES.[1]

By G. H. Corbett and E. Hargreaves,
Carnegie Students, Bussey Institution, Harvard University.

The subfamily Vulturopinæ was erected by C. H. T. Townsend in 1912 to include a very peculiar member of the Order Corrodentia from Peru.[2] The type species, *Vulturops termitorum*, was found in the covered runways of a species of Hamitermes at Piura in northern Peru.

Recently, on examining some Aleurodidæ taken from an orange tree at Orlando, Fla., on October 1, 1914, we were very much surprised to find with them one adult specimen which is very closely related to the Peruvian form. The North American species is very similar to *V. termitorum*, but differs in wing neuration as well as in other characters and evidently represents a distinct species of the same genus.

Vulturops floridensis sp. nov

The insect as a whole is dark brown in color, the thorax and head being darker than the abdomen, and is about 1.6 mm. in length.

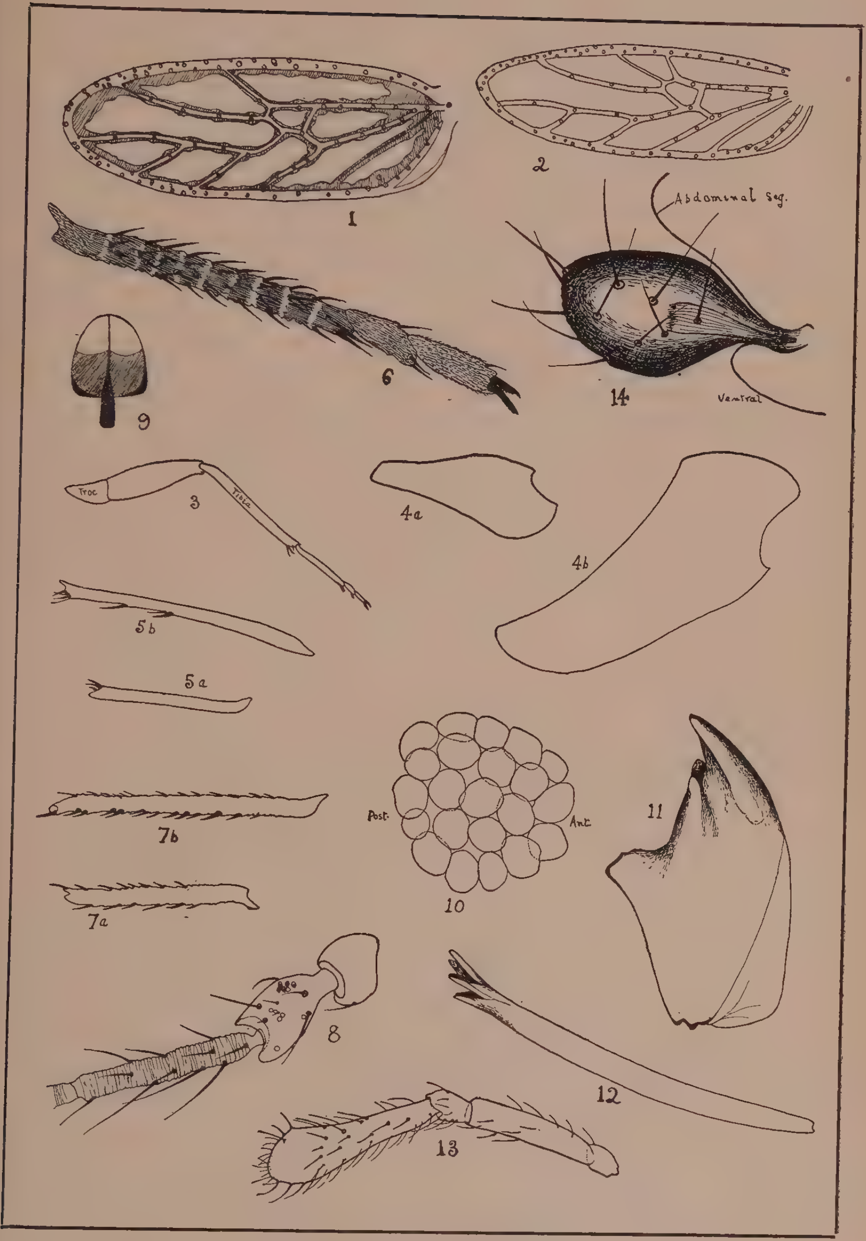
Wings (fig. 1). Only one pair present. They are somewhat elliptical, 1 mm. in length, about two and a half times longer than broad; for comparison, a reproduction of the wing of *V. termitorum* is given (fig. 2). On the dorsal surface chiefly along the veins are structures resembling spine bases, although there were no traces of the spines themselves. They also occur to some extent on the ventral surface. The wing-veins are very prominent, and are accompanied alongside by areas which are probably blood sinuses (shaded in figure).

Legs (fig.3). The hind legs are about 1½ times the length of the others, the coxæ, femora, tibiæ and first tarsal segment, being each respectively much longer (for comparison, see figs. 4, 5, 7). The tibiæ exhibit a kind of pseudosegmentation, each division being very finely striated longitudinally. This is also evident in the first tarsal segments (fig. 6). On the hind tibiæ are three strong spines which are absent in the two anterior pairs (fig. 5). The second and third tarsal segments are clothed with very fine hairs. The tarsi terminate in a pair of sharp, toothed claws.

---

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 92.

[2] Entom. News, Vol. 23, pp. 266–269. (1912.)



CORBETT AND HARGREAVES—*Vulturops.*

Antennæ (fig. 8). Only the basal portion is described, as the remainder was missing. The first segment is broader than long; the second longer than broad, constricted at the base and, in addition to spines, bears a group of sense organs of the Hicksonian type. One of these is shown greatly enlarged in fig. 9. The remaining segments show pseudosegmentation, and bear very long spines.

Eyes (fig. 10). Compound, with 23 facets.

Mandibles (fig. 11). Very large and heavily chitinised.

Maxillae (fig. 12). Chitinous rod-like structures, concave on the inner side towards the distal end, and terminating in three pairs of processes.

Maxillary palpi (fig. 13). Consist of four segments, the 4th being flattened and expanded towards the apex.

Abdomen. Globose, about half the length of the entire body, thinly chitinised, and bears long slender spines. On the venter towards the apex is a sac-like protrusion which is a little more heavily chitinised than the rest, and bears long spines (fig. 14). Inside the sac towards the base is a thick strand which may be muscle, or, being a potash preparation, a structure for the attachment of muscles.

EXPLANATION OF PLATE.

1. *Vulturops floridensis* sp. nov., left wing from above.
2. *Vulturops termitorum* Townsend, left wing from above.
3. *Vulturops floridensis* sp. nov., anterior leg (coxa not shown).
4a. *Vulturops floridensis* sp. nov., coxa of front leg.
4b. *Vulturops floridensis* sp. nov. coxa of hind leg.
5a. *Vulturops floridensis* sp. nov., tibia of front leg.
5b. *Vulturops floridensis* sp. nov., tibia of hind leg. (Note the three large spines, absent in 5a.)
6. *Vulturops floridensis* sp. nov., tarsus of front leg. (Note pseudosegmentation, fine striations, toothed claws, and the fine hairs on the second and third segments.)
7a. *Vulturops floridensis* sp. nov., first tarsal segment of front leg.
7b. *Vulturops floridensis* sp. nov., first tarsal segment of hind leg.
8. *Vulturops floridensis* sp. nov., base of right antenna, ventral view. (Note pseudosegmentation, sense organs on the second segment, and long spines.)
9. *Vulturops floridensis* sp. nov., sense organ greatly enlarged.
10. *Vulturops floridensis* sp. nov., eye.
11. *Vulturops floridensis* sp. nov., left mandible, ventral view.
12. *Vulturops floridensis* sp. nov., left maxilla, ventral view.
13. *Vulturops floridensis* sp. nov., left maxillary palpus, ventral view.
14. *Vulturops floridensis* sp. nov., sac-shaped protrusion on ventral side of abdomen.

All figures drawn with camera lucida by E. Hargreaves.

TWO NEW SPECIES OF HISTER.[1]

By F. G. Carnochan

Hister solaris sp. nov.

Oval, shining, about the size of *Hister furtivus.* Head punctate with frontal stria semicircular, deeply impressed, not reëntrant. Pronotum punctate, external and internal striæ entire, gradually approaching at base, and between them confused striæ usually extending past the middle. Margin of thorax ciliate. Three entire dorsal striæ, the fourth basal, with a faintly defined apical appendix, the fifth apical, faintly defined; the sutural apical, sometimes extending as far as the middle; outer subhumeral a short mark in the basal third, faintly impressed or absent, inner subhumeral visible as a short stria apically, or reduced to a few shallow punctures, which are barely discernible. Elytra red with trapezoidal black spot and black posterior margins; inflexed portion of elytra red, shading to brown at extreme edge. Anterior femora brownish, bidentate, middle and hind femora red, tipped with black at each end. Length (from base of thorax to apex of elytral suture) 3.5 mm.

This species is closely related to *arcuatus*, differing from it only in color, which in *arcuatus* is mahogany and black, while in this species in orange-red and black, and in the distribution of the color. *Arcuatus* has the mahogany spot surrounded with black, the inflexed flanks being black. This species has the inflexed flanks orange-red. *Arcuatus* is slightly larger and more robust.

Described from six specimens; two from Wenatchee, Washington, May 8, 1908 (W. M. Mann); one from Wawawai, Washington, April 24, 1909 (W. M. Mann); one from Corvallis, Oregon, April 20, 1910 (sent to me by C. A. Frost); two in the collection of the American Museum of Natural History from Douglas, Wyoming, and Nevada. The type from Wenatchee, is in my collection; the others are in the collections of Mann, Frost and the American Museum.

Hister ednæ sp. nov.

Oval, black, shining, about the size of *Hister sedecimstriatus.* Head with a few indistinct punctures, frontal stria semicircular, entire, not reëntrant. Prothorax bistriate; the outer stria entire, slightly sinuate; the inner also entire, slightly sinuate, closer to the outer at the base than at the apex, and slightly hooked inward at the base; sparsely punctate laterally inside inner stria for one-half the length of stria from base, also with a finely punctate area in front of the scutellum. Elytra with five deeply impressed striæ, the fourth very slightly abbreviated at base; the fifth arching at base and joining the sutural; oblique humeral finely impressed; subhumeral subentire, not quite attaining the base, deeply impressed; the inner subhumeral represented by a series of distant punctures in the apical half. Propygidium bordered by fine, dense punctures, inside of which are very coarse punctures which become more widely separated towards the center and apex, which is nearly smooth. Pygidium much more finely and densely punctate, the punctures becoming more sparse at the apex. Prosternal lobe margined. Mesosternum subtruncate, with an entire marginal stria which is deeply impressed. Anterior tibiæ five-dentate; the four lower teeth large and distinct, the upper tooth reduced to a small denticle; the first tooth not bifid. Length (from base of thorax to apex of elytral suture) 2 mm.

---

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 100.

This well-marked species can not be assigned to any of Horn's groups. In general appearance and elytral striation it closely resembles *sedecimstriatus*, but the single subhumeral, the presence of two entire thoracic striæ, and the slightly emarginate mesosternum prevent its being placed in the *americanus* group; it cannot be placed in the *servus* group to which its mesosternum would lead because of the entire subhumeral, the five entire dorsal striæ and the five-dentate tibiæ, nor can it be placed in the *merdarius* group because of the completeness of the elytral pattern. It should be placed as a connecting link between the *servus* and the *americanus* groups.

Described from two specimens collected at Southern Pines, North Carolina, March 19, 1912. (A. H. Manee). The type is in my collection.

EXCHANGE COLUMN.

Will exchange insects of various orders for Parasitic Hymenoptera from any part of the world.—C. T. Brues, Bussey Institution, Forest Hills, Mass.

Wanted. Ants from all parts of the world.—W. M. Wheeler, Bussey Institution, Forest Hills, Mass.

I pay cash or give American and exotic insects in exchange for fertile eggs of Catocala spp., *living* Catocala ♀♀ (captured specimens only), hibernating pupæ and larvæ of any other group of Lepidoptera.—William Reiff, 366 Arborway, Jamaica Plain, Boston, Mass.

Florida insects of all orders, also Fish, Batrachians, Reptiles, Shells and Marine Invertebrates sold by A. G. Reynolds, Gulfport, Florida.

New England Orthoptera identified. I wish to examine adult Orthoptera of all families from all parts of New England. Material will be identified for the privilege of retaining desired examples, for which good exchanges will be given, subject to approval of owner.—A. P. Morse, Wellesley College, Wellesley, Mass.

The undersigned will greatly appreciate receiving records of New Jersey species not listed in Smith's Insects of New Jersey.—Harry B. Weiss, 272 Hale St., New Brunswick, N. J.

Offered for cash, but exchange preferred. Fitch and early Illinois reports; Insect Life; Harris's Insect; many others.—J. E. Hallinen, Cooperton, Okla.

Histeridæ. North American Histeridæ identified or unidentified, desired in exchange for beetles of other families. F. G. Carnochan, Bussey Institution, Forest Hills, Massachusetts.

Hemiptera-Heteroptera. I desire specimens of this group from all regions, especially New England. I will give in exchange species of this and other orders (except Lepidoptera), and will identify New England material. Correspondence desired.—H. M. Parshley, Bussey Institution, Forest Hills, Mass.

Wanted: Psyche, Vol. VIII, No. 265 (May, 1898); No. 267 (July, 1898); No. 268 (August, 1898); Vol. IX, No. 300 (April, 1901). Address, giving price, Librarian, Stanford University, Cal.

Sarcophagidæ from all parts of the world bought or exchanged according to arrangement. North American material determined.—R. R. Parker, Entomological Laboratory, Massachusetts Agricultural College, Amherst, Mass.

Wanted: Transactions American Entomological Soc., Vol. 4; Entomological News, Vol. 2, Nos. 6 and 10; Vol. 8, Nos. 1 and 6; Vol. 9, Nos. 1 and 2; Vol. 10, No. 10; Vol. 11, Nos. 1, 3 and 5. Will purchase at reasonable price.—Howard L. Clark, P. O. Box 1142, Providence, R. I.

Wanted: Insects of any order from ant nests, with specimens of the host ants, from any part of the world; also Cremastochilinæ of the world. Will give cash or Coleoptera, Hymenoptera and Diptera from the United States.—Wm. M. Mann, Bussey Institution, Forest Hills, Boston, Mass.

Ward's Natural Science Establishment

84-102 College Ave.

ROCHESTER, N. Y.

We have purchased the entire stock in trade of the **American Entomological Co., of Brooklyn,** and are now prepared to furnish all the material formerly sold by them.

We call particular attention to our

ONLY GENUINE SCHMITT INSECT BOXES

Insect Cabinets and Exhibition Cases. A full description of these is given in the A. E. Catalogue, No. 9, which will be sent free to those interested.

We make a specialty of material for dissection and can furnish all forms from the lowest invertebrates to vertebrates.

We also manufacture the

AMERICAN ENTOMOLOGICAL COMPANY'S INSECT PINS

which are pronounced superior to all others by prominent Entomologists. If you do not know these send us a trial order.

American Entomological Company's Price List, No. 7 contains a list with prices of our large stock of Lepidoptera as well as description of our various insect collections. Sent free to our customers. Price twenty-five cents to those not on our books.